

Near Space Characterization of Advanced Photovoltaics

Naval Research Laboratory

nrl.navy.mil

At a Glance

What is it?

NSCAP is building a user facility, operated by NRL, teamed with AFRL and NASA GRC, to calibrate solar cells for use in space.

How does it work?

Solar cells are mounted to a system that flies on a high altitude balloon to provide current vs. voltage measurements above the Earth's atmosphere.

What will it accomplish?

The NSCAP facility provides a reusable platform for regular, cost effective access to near space calibration of solar cells

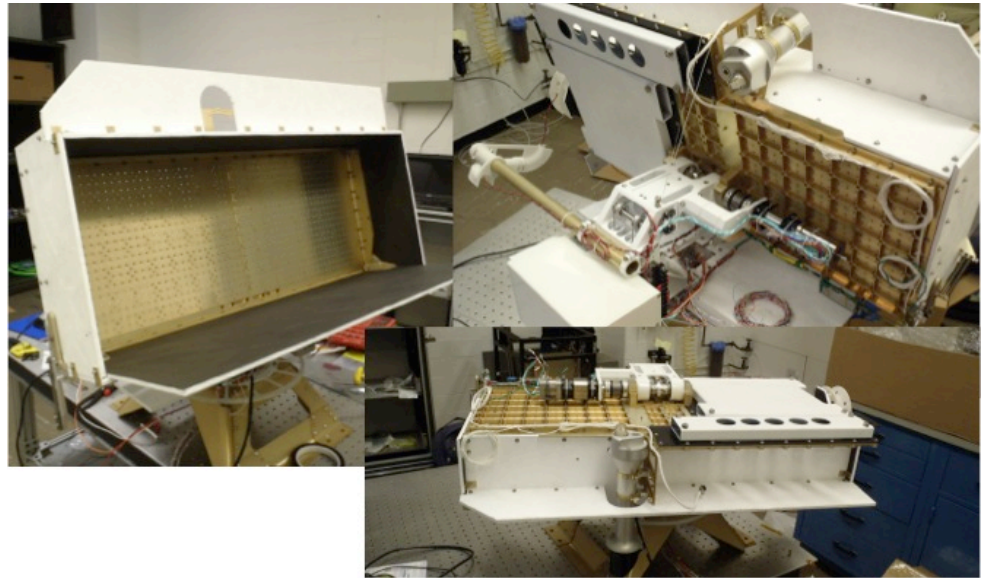


Photo: The NSCAP Calibration platform under construction.

Nearly all spacecraft are powered by photovoltaics, i.e. solar cells. Because the solar spectrum in space (referred to as Air Mass Zero (AM0)) is significantly different than that on Earth (e.g. AM1 or AM1.5), ground-based measurements of space solar cells are made in a laboratory using solar simulator light sources. For accurate measurement, the light output from the simulator must be calibrated to match the expected solar output. This calibration is done by placing a detector (typically a solar cell) of known output (i.e. calibrated) in the light beam and adjusting the simulator output. NSCAP provides a means for creating a calibrated solar cell for making space solar cell measurements.

For space calibration, a standard must be exposed to light with the proper spectrum. One could use an outdoor facility, but this is limited in accuracy because of the spectral mismatch between AM1.5 and AM0. The preferred method is to take solar cells above the atmosphere for measurement. This is typically achieved using the NASA Lear-Jet facility and high altitude balloon flights. NSCAP is building a balloon flight facility. The NSCAP team integrates solar cells from a variety of customers onto the balloon payload, flies the balloon, performing current vs. voltage measurements on each cell during the flight. After flight, the payload is retrieved, and the cells are removed and returned to the customers to be used as primary standards.

Annual or semiannual flight campaigns will be performed, depending on demand. Anyone interested in having cells flown should Email the contact point give to the left.

List of Publications

“A New Air Mass Zero Calibration Facility Using The High Altitude Balloon Method,”

P. Jenkins, D. Wilt, D. Scheiman, B. Anspaugh, M. Pisczcor, D. Snyder, D. Ball, J. Juneau, H. Franco, D. Orr, S. Cannon, J. Lorentzen, R. Walters, and Brad Reed, *Proceedings of the 9th European Space Power Conference (ESPC)*, held June 6-10 June 2011, Saint Raphael, France, ESA Publication SP-690, ISBN: 978-92-9092-257-5